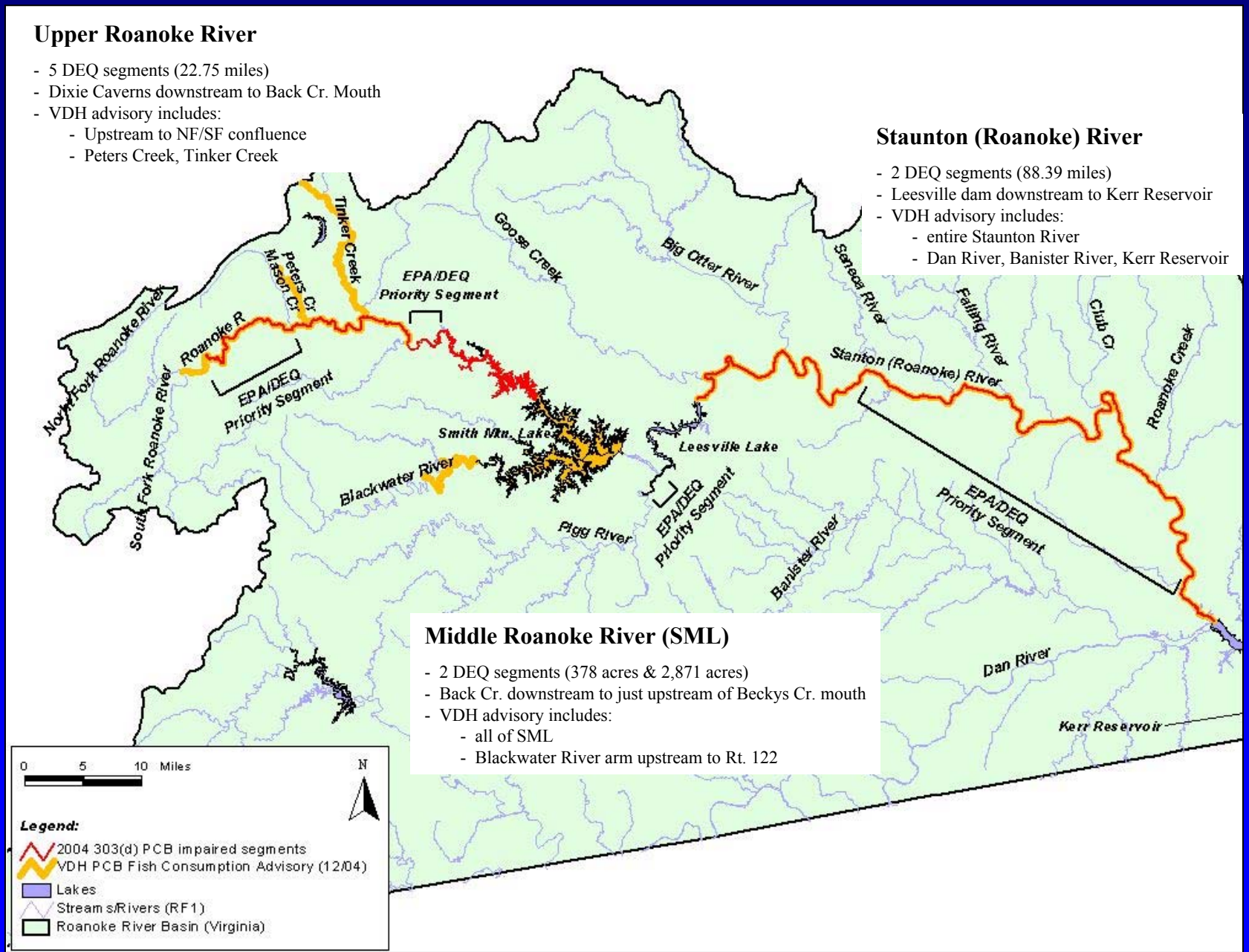
PCB Total Maximum Daily Load Development for the Roanoke River

March 21, 2005

PCB Study Overview

- Scope: Develop PCB TMDLs for Roanoke River PCB Impaired Segments
- Watershed Division:
  - Upper/Middle Roanoke (including SML)
  - Staunton River
- Consider all PCB sources in the watershed
- Study Components:
  - Data Review and Source Identification (*preliminary report completed)
  - Develop monitoring plan and conduct sampling
  - Identify and characterize PCB sources
  - Develop watershed/river model to assess PCB impacts and calculate TMDLs.

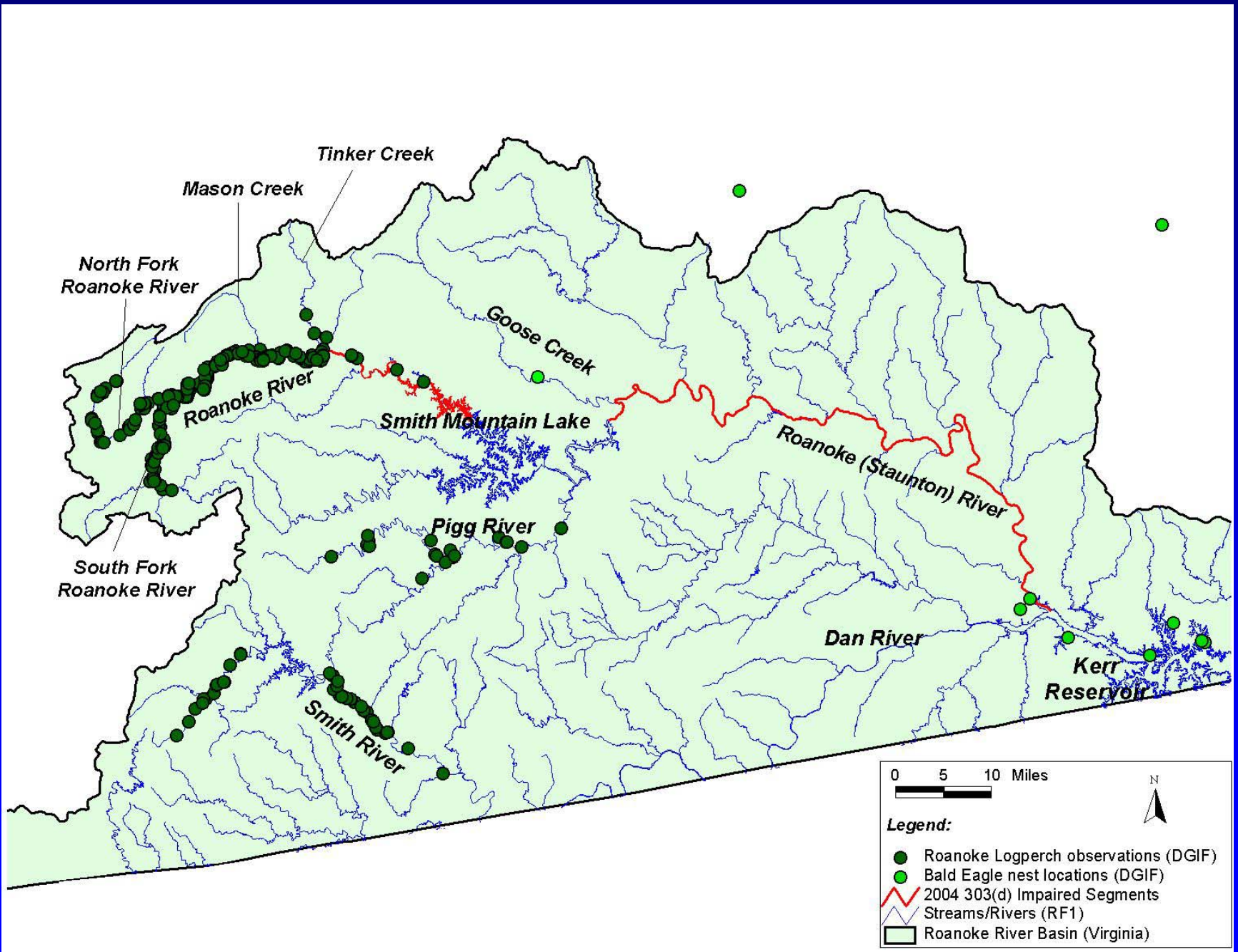
PCB Impaired Segments and Fish Consumption Advisories



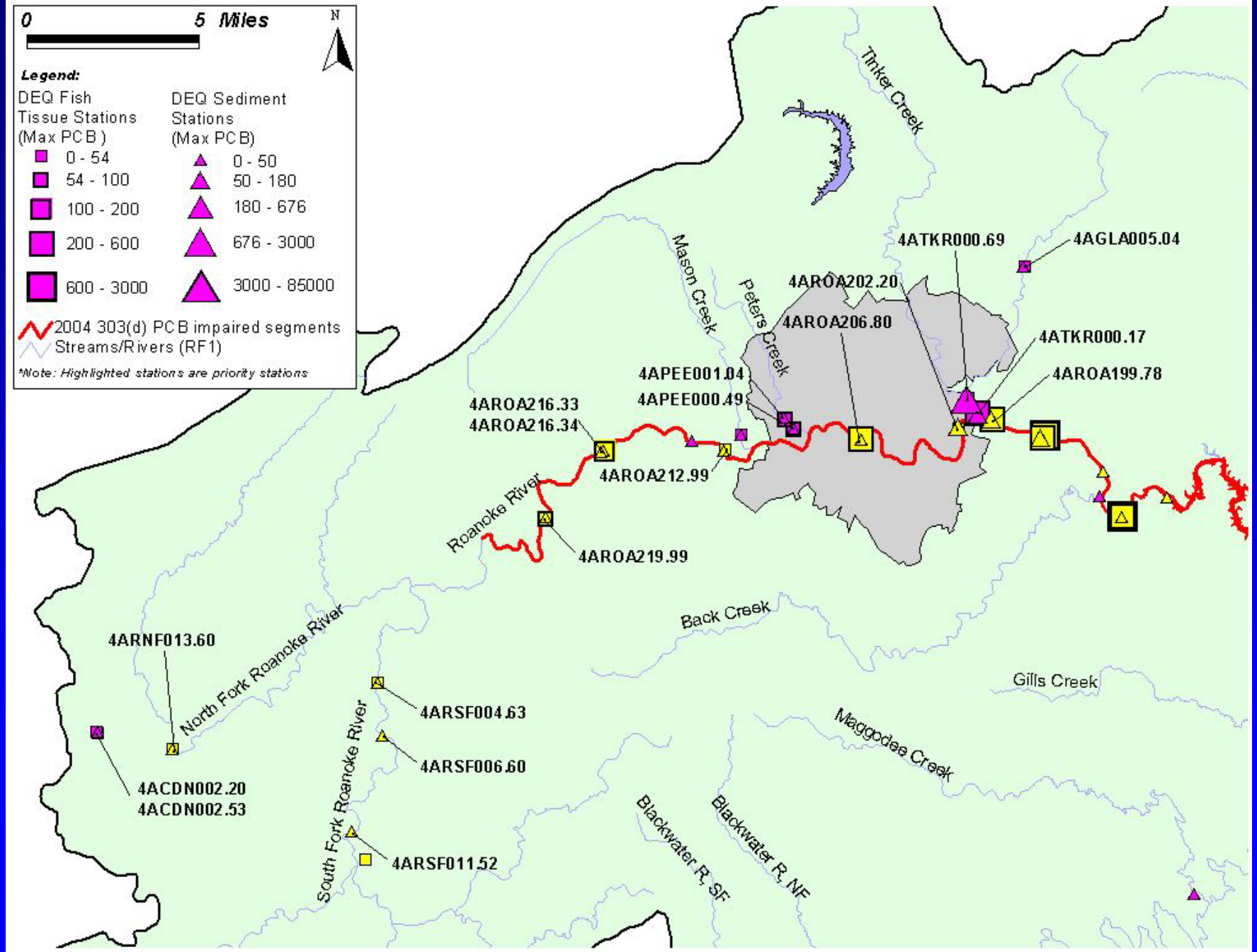
PCB Characteristics

- PCBs are hydrophobic and tend to adsorb to soil particles.
- PCBs typically accumulate in sediment depositional areas ("hot spots").
- PCBs bioaccumulate in animal tissues and have an affinity for lipids (fatty tissue). Food chain bioaccumulation.
- Human Health concerns (fish consumption)
- Endangered Species concerns
  - Roanoke Logperch (*Percina rex*)
  - Orangefin Madtom (*Nocturus gilberti*) – threatened status
  - Bald Eagles

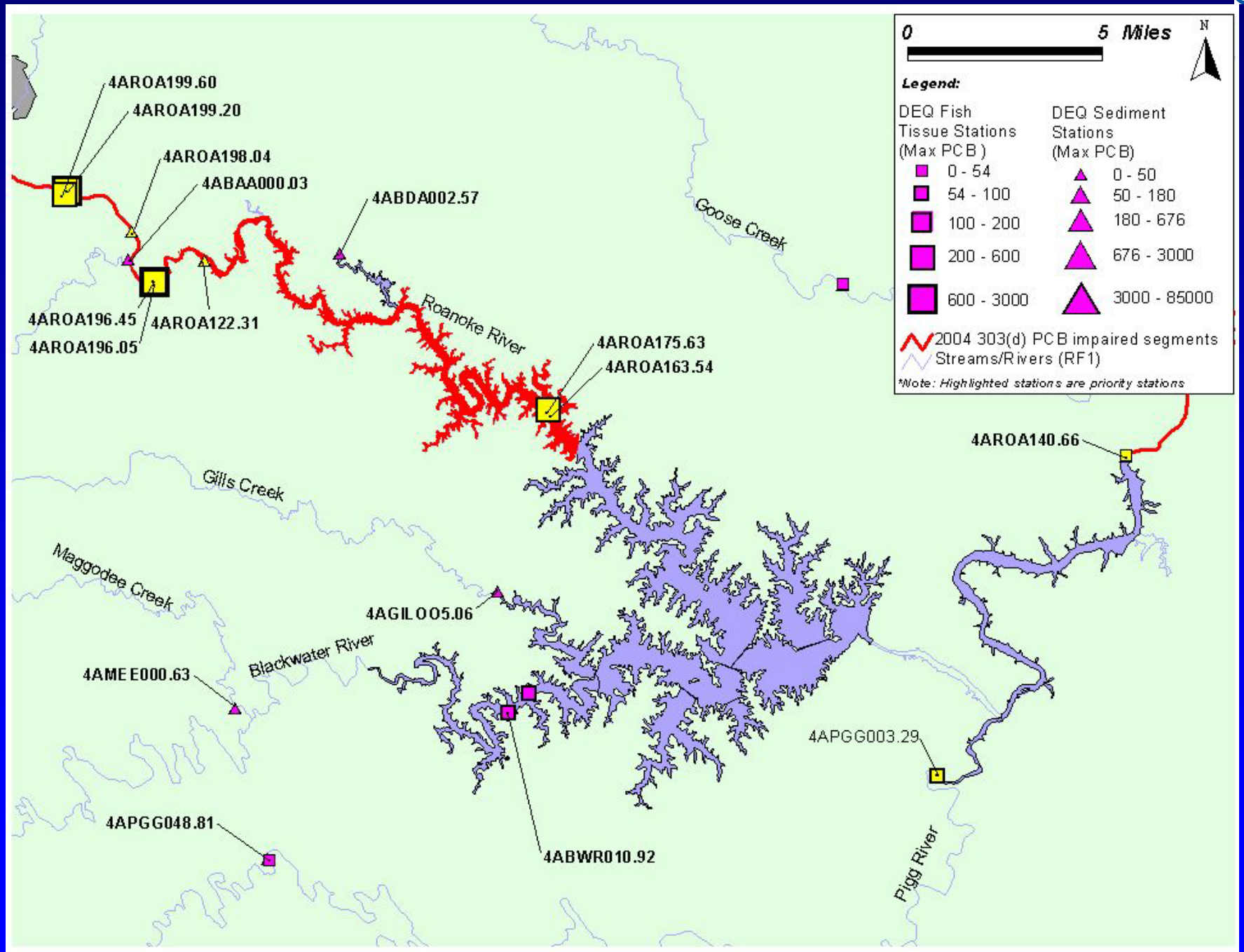
Endangered Species Observations

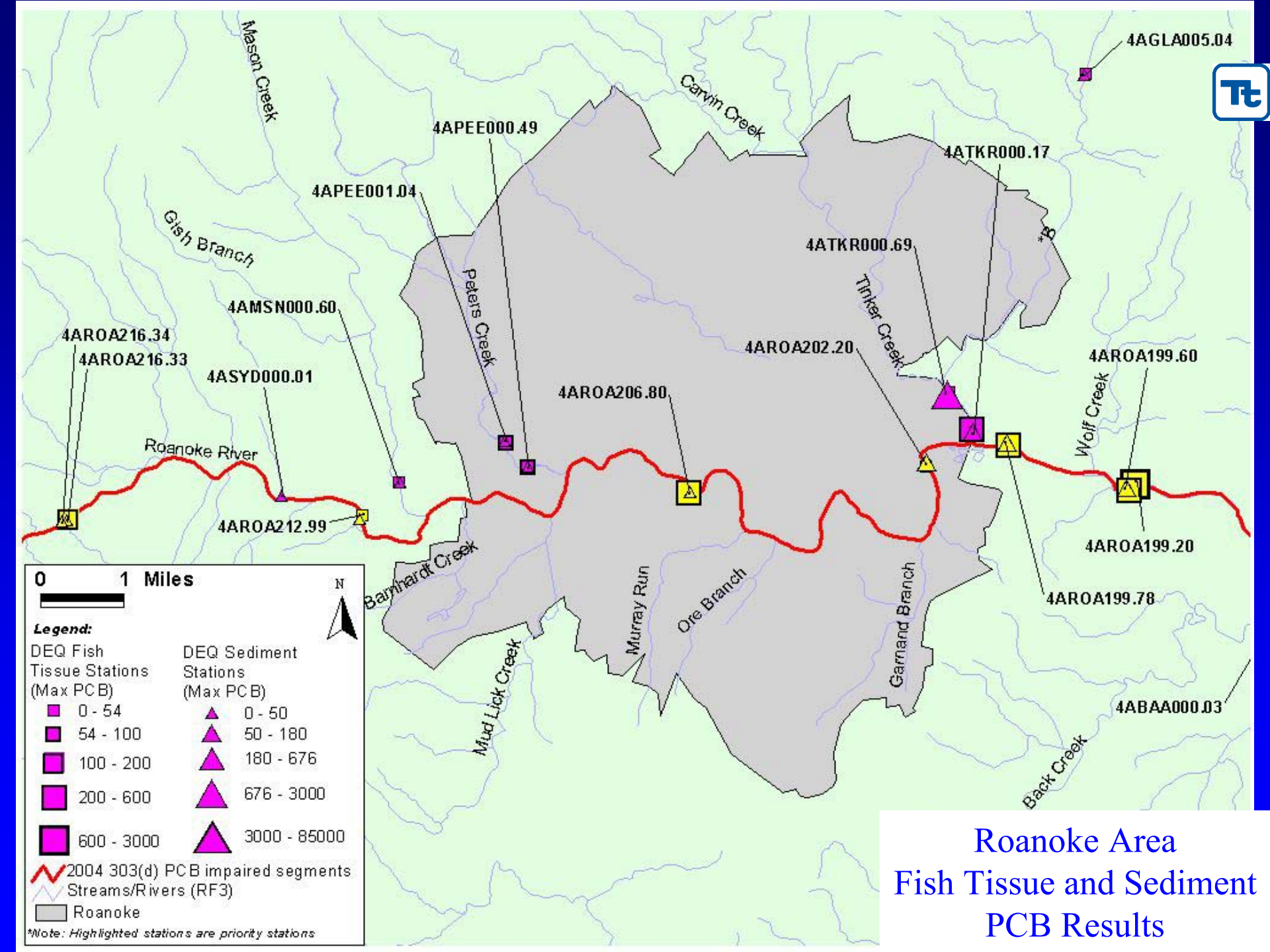


PCB Spatial Analysis (max. conc.) – Upper Roanoke



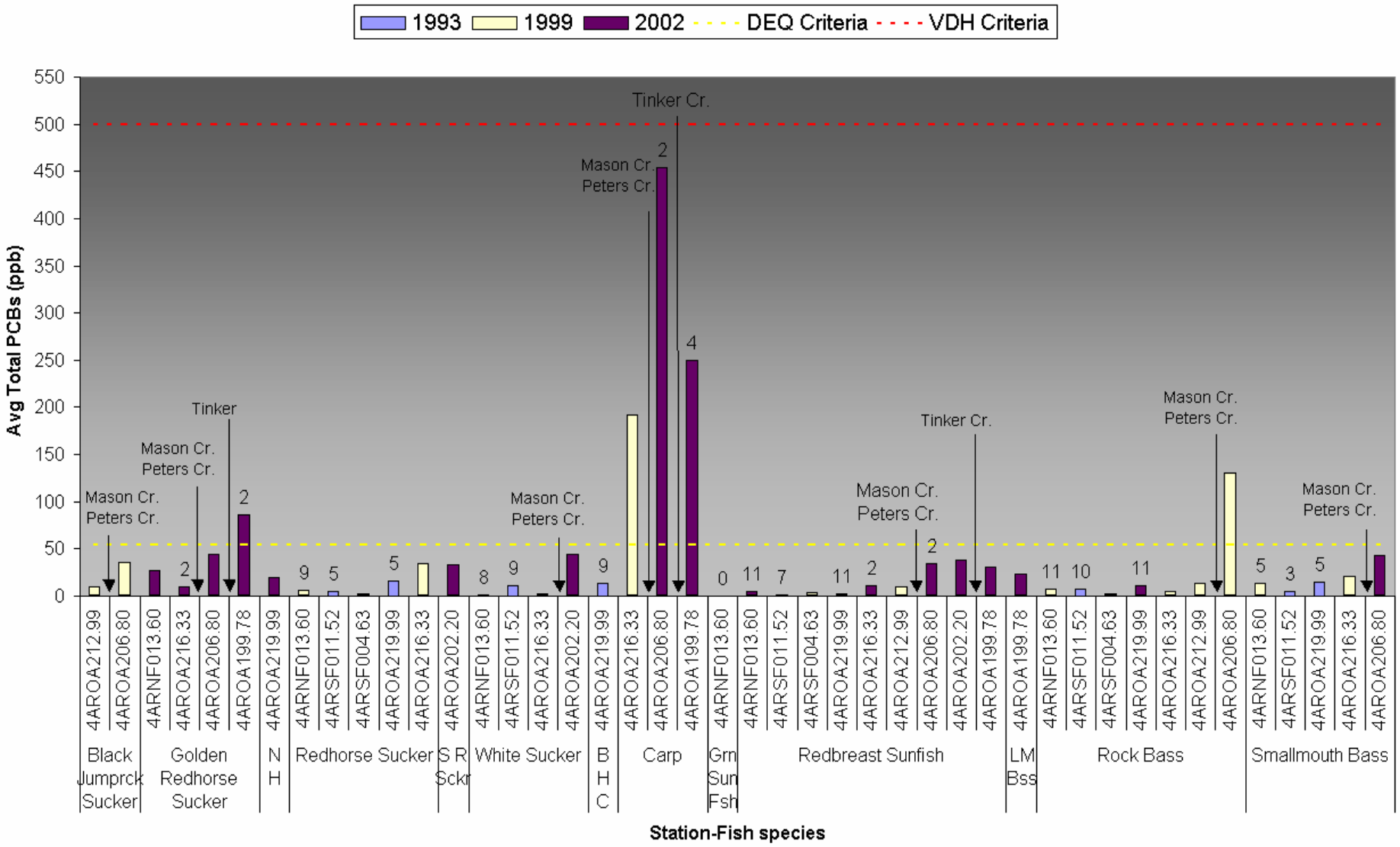
PCB Spatial Analysis (max. conc.) – Middle Roanoke (SML)

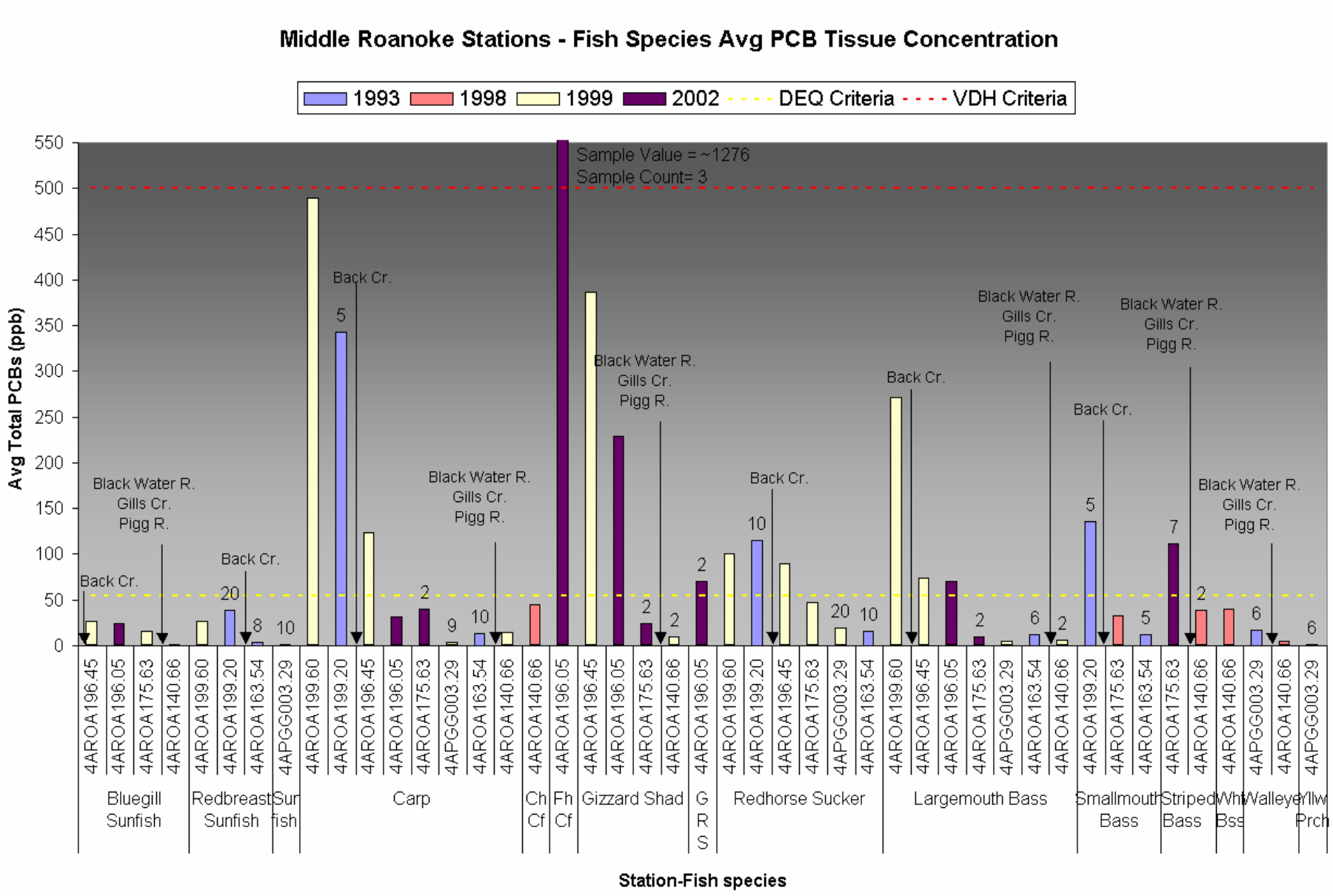


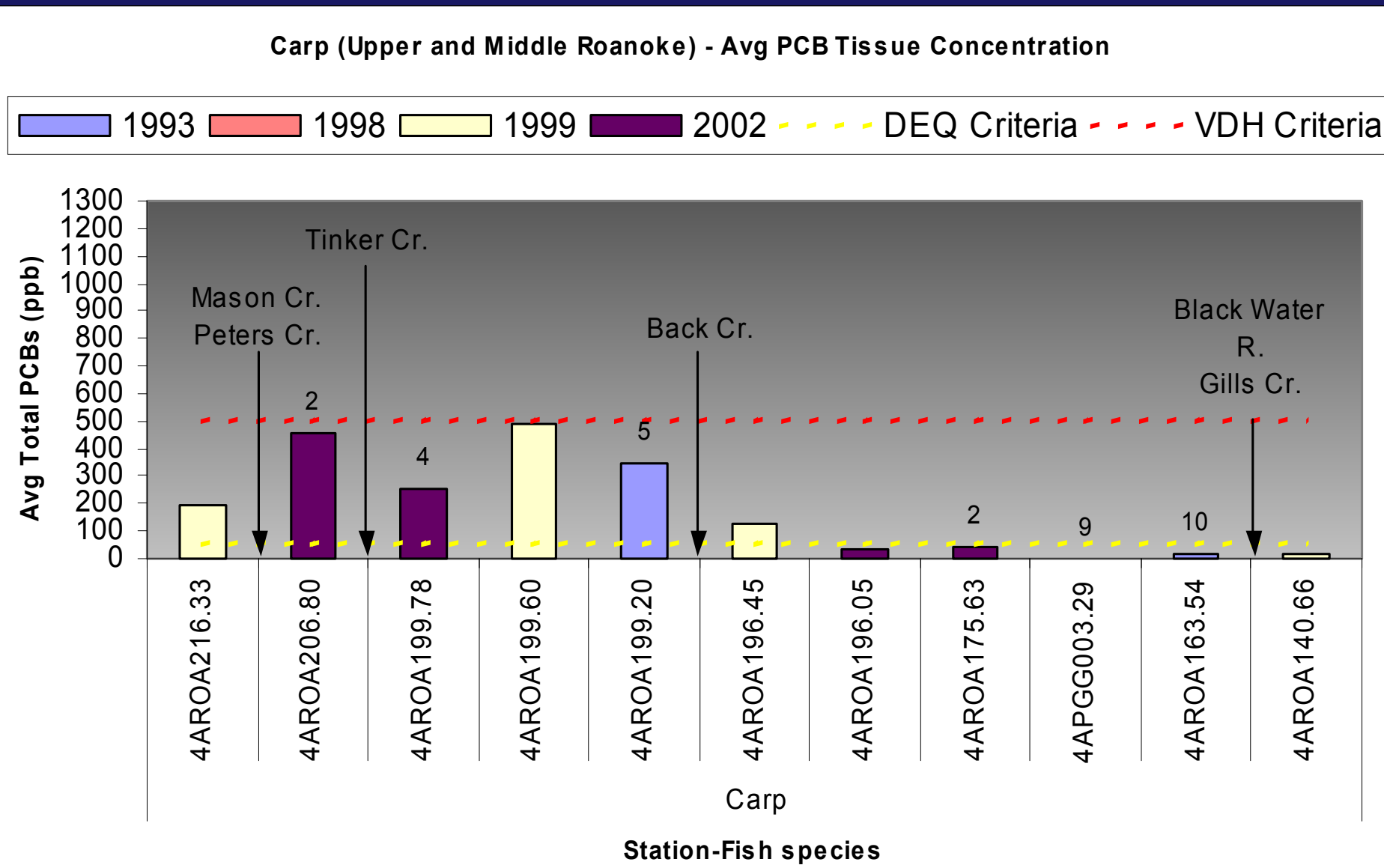


Roanoke Area
Fish Tissue and Sediment PCB Results

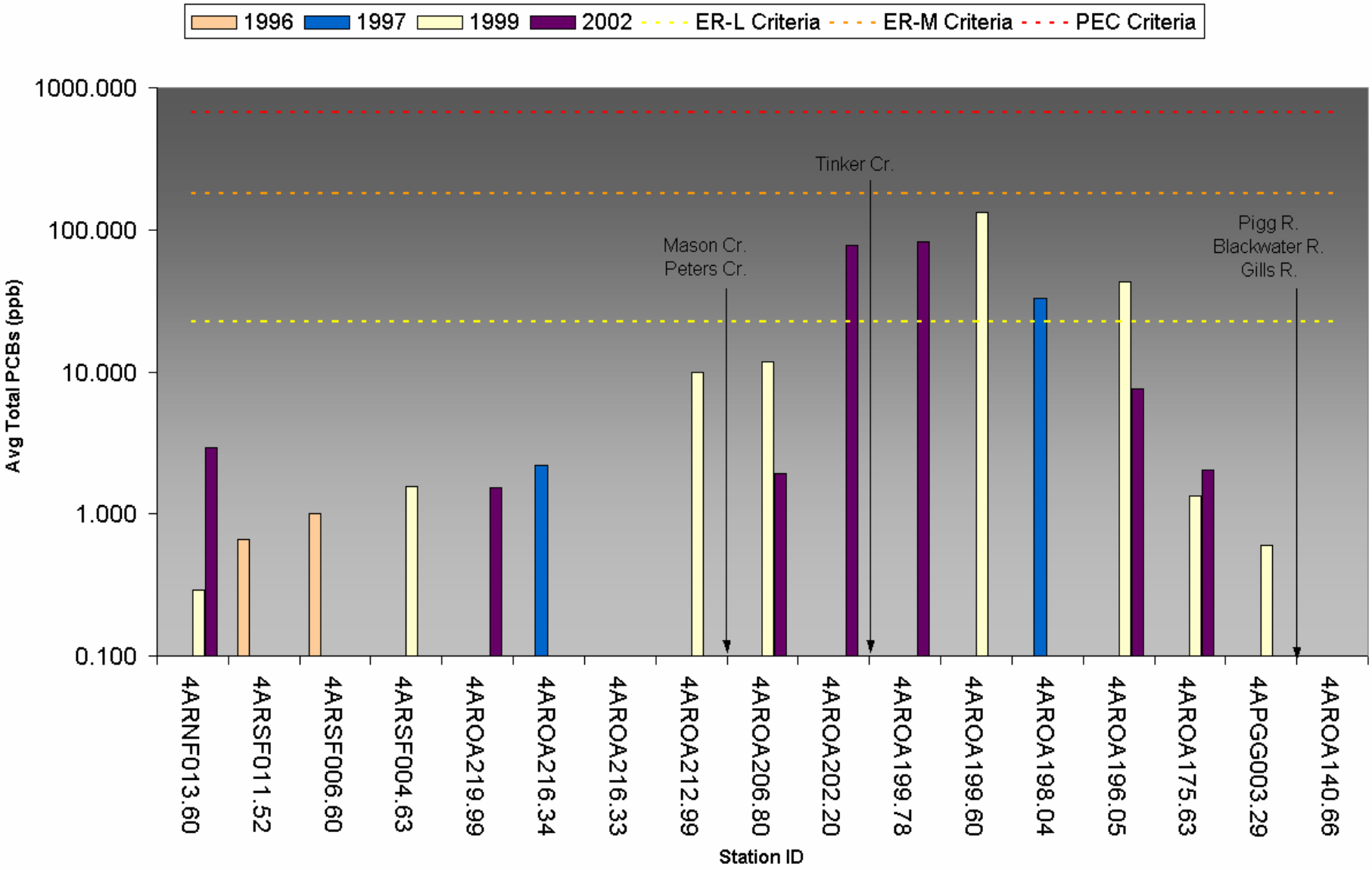
Upper Roanoke Stations - Fish Species Avg PCB Tissue Concentration




Middle Roanoke Stations - Fish Species Avg PCB Tissue Concentration
1993
1998
1999
2002
DEQ Criteria
VDH Criteria
Avg Total PCBs (ppb)
550
500
450
400
350
300
250
200
150
100
50
0
Sample Value = ~1276
Sample Count= 3
Back Cr.
Black Water R.
Gills Cr.
Pigg R.
4AROA196.45
4AROA196.05
4AROA175.63
4AROA140.66
4AROA199.60
4AROA199.20
4AROA163.54
4APGG003.29
4AROA140.66
4AROA196.05
4AROA196.45
4AROA196.05
4AROA175.63
4AROA140.66
4AROA196.05
4AROA199.60
4AROA199.20
4AROA196.45
4AROA175.63
4APGG003.29
4AROA163.54
4AROA199.60
4AROA196.45
4AROA196.05
4AROA175.63
4APGG003.29
4AROA163.54
4AROA140.66
4AROA199.20
4AROA175.63
4AROA163.54
4AROA175.63
4AROA140.66
4AROA140.66
4APGG003.29
4AROA140.66
4APGG003.29
Bluegill Sunfish
Redbreast Sunfish
Sun fish
Carp
Ch Cf
Fh Cf
Gizzard Shad
G R S
Redhorse Sucker
Largemouth Bass
Smallmouth Bass
Striped Bass
Wht Bss
Valley Yllw Prch
Station-Fish species


Carp (Upper and Middle Roanoke) - Avg PCB Tissue Concentration
1993
1998
1999
2002
DEQ Criteria
VDH Criteria
Avg Total PCBs (ppb)
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
Mason Cr.
Peters Cr.
Tinker Cr.
Back Cr.
Black Water
R.
Gills Cr.
2
4
5
2
9
10
4AROA216.33
4AROA206.80
4AROA199.78
4AROA199.60
4AROA199.20
4AROA196.45
4AROA196.05
4AROA175.63
4APGG003.29
4AROA163.54
4AROA140.66
Carp
Station-Fish species

Upper and Middle Roanoke Stations - PCB Sediment Concentration



PCB Source Identification Process

- Review PCB fish tissue and sediment data
- Obtain information on active and legacy sources of PCBs in the watershed
- Consult with local stakeholders
- Conduct additional monitoring as necessary

Potential Sources

- Upper Roanoke and SML listed as impaired for PCBs in 2002
- Prior source investigations focused on Staunton River (listed in 1998)

Candidate sources:

- Dixie Caverns Landfill (Western Roanoke County) – Superfund
  - Closed in 1976. Received municipal and industrial wastes
  - EPA cleanup activities included excavation of sludge pit, remediation of fly ash pile (contains heavy metals), and removal of discarded drums.
  - Based on 5-year review, PCB contamination not considered significant. Limited mobility offsite.

- November 1985 Flood – CERCLIS 1999
  - Washed approximately 1,500 drums into the Roanoke River
  - Unclaimed drums (300) were disposed in Dixie Caverns landfill according to EPA CERCLIS review (10/5/99). At least 1 drum had high PCB levels.

- Thompson Landfill (Montgomery Co.) – CERCLIS 1999
  - 2,400-3,000 drums buried from 1977 to 1980 with unknown contents
  - Intermittent stream flows into Den Creek (trib. NF Roanoke River)

Potential Sources

- American Viscose Company (Roanoke City, upstream of Tinker Cr.) – CERCLIS 1999
  - Produced viscose yarn for tires, carpets, and cellophane
  - Lagoon onsite that received rayon wastes – was backfilled. Industrial wasted deposited in a landfill onsite
  - PCBs detected in soil samples
  - Roanoke River Flood Control Study (USACOE)
    - Channel widening proposed through this site.
    - PCBs detected in soil samples. Altered plans to stop channel widening at American Viscose property.
    - Facility is located within 1-year floodplain
- Evans Chemical (Roanoke City, below Peters Cr.) – CERCLIS 2005
  - PCBs detected soil samples
- Old Salem Tannery – CERCLIS 2005
  - Low-levels of PCBs detected in soil samples
- Other Possible PCB sources
  - Roanoke River Flood Control Project – PCBs detected in bank samples
  - Other industrial facilities that may have used PCBs and landfills in the region

Next Steps

- Continue review of available PCB source information
- Consult with local stakeholders to identify additional source information
- Identify data gaps
- Develop sampling plan to help identify PCB sources and "hot spots"
  - North and South Forks: no PCB problems noted
  - Monitoring focus:
    - Mason Creek, Peters Creek, and downstream
    - Tinker Creek drainage